

FlowCam Studies				
Publication	Volume	Date	Authors	Title
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2021.09.047	Oct 2021	Hiroko Shibata, Akira Harazono, Masato Kiyoshi, Akiko Ishii-Watabe	Quantitative Evaluation of Insoluble Particulate Matters in Therapeutic Protein Injections Using Light Obscuration and Flow Imaging Methods
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2021.07.004	Oct 2021	A.D. Grabarek, W. Jiskoot, A. Hawe, K. Pike-Overzet, T. Menzen	Forced degradation of cell-based medicinal products guided by flow imaging microscopy: Explorative studies with Jurkat cells
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2021.09.010	Sep 2021	Muhammad Umar, Nils Krause, Andrea Hawe, Friedrich Simmel, Tim Menzen	Towards quantification and differentiation of protein aggregates and silicone oil droplets in the low micrometer and submicrometer size range by using oil-immersion flow imaging microscopy and convolutional neural networks
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2021.07.001	Sep 2021	Nam Ah Kim, Shavron Hada, Dong Jun Kim, Du Hyung Choi, Seong Hoon Jeong	Off-label use of plastic syringes with silicone oil for intravenous infusion bags of antibodies
<i>Translational Vision Science & Technology</i>	doi: 10.1167/tvst.10.9.21	Aug 2021	Marc Schargus, Katharina Tatjana Kopp, Constanze Helbig, Andreas Frings, Gerhard Winter	Comparison of Syringes With Intravitreal Anti-VEGF Drugs: Particle Burden and Protein Aggregates in Brolicizumab, Aflibercept and Bevacizumab
<i>Scientific Reports</i>	doi: 10.1038/s41598-021-84158-0	Feb 2021	Lydianne Lumack do Monte Agra, Natasha Ferreira Santos da Cruz, Vaida Linkuviene, John F. Carpenter, Michel Eid Farah, Gustavo Barreto Melo, Mauricio Maia	High particle variability across siliconized and oil-free syringes and needles from the same lots
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2021.01.006	Jan 2021	Robina M. Meyer, Lukas Berger, Joerg Nerkamp, Stefan Scheler, Sebastian Nehring, Wolfgang Friess	Identification of Monoclonal Antibody Variants Involved in Aggregate Formation - Part 2: Hydrophobicity Variants
<i>The AAPS Journal</i>	doi: 10.1208/s12248-020-00547-9	Jan 2021	Nils Krause, Sebastian Kuhn, Erik Frotscher, Felix Nikels, Andrea Hawe, Patrick Garidel, Tim Menzen	Oil-Immersion Flow Imaging Microscopy for Quantification and Morphological Characterization of Submicron Particles in Biopharmaceuticals
<i>Biotechnology and Bioengineering</i>	doi: 10.1002/bit.27501	Jul 2020	Austin L. Daniels, Christopher P. Calderon, Theodore W. Randolph	Machine learning and statistical analyses for extracting and characterizing "fingerprints" of antibody aggregation at container interfaces from flow microscopy images
<i>Cytotherapy</i>	doi: 10.1016/j.jcyt.2020.04.093	Jun 2020	A.D. Grabarek, E. Senel, T. Menzen, K.H. Hoogendoorn, K. Pike-Overzet, A. Hawe, W. Jiskoot	Particulate impurities in cell-based medicinal products traced by flow imaging microscopy combined with deep learning for image analysis
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.034	Jan 2020	Arni Gambe-Gilbuena, Yuriko Shibano, Elena Krayukhina, Tetsuo Torisu, Susumu Uchiyama	Automatic Identification of the Stress Sources of Protein Aggregates Using Flow Imaging Microscopy Images
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.065	Nov 2019	Hristo L. Svilenov, Alina Kulakova, Matja Zalar, Alexander P. Golovanov, Pernille Harris, Gerhard Winter	Orthogonal techniques to study the effect of pH, sucrose and arginine salts on monoclonal antibody physical stability and aggregation during long-term storage
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.017	Oct 2019	R.E. Cavicchi, Dean C. Ripple, Bioprocess Measurements Group	Improving Diameter Accuracy for Dynamic Imaging Microscopy for Different Particle Types
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.064	Oct 2019	Siska C, Harber P, Kerwin BA	Shocking Data on Parcel Shipments of Protein Solutions
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.041	Oct 2019	Carly F. Chisholm, William Behnke, Yekaterina Matskiv, Ashley A. Frazer-Abel, Theodore W. Randolph	Sub-visible Particles in IVIg Formulations Activate Complement in Human Serum
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.10.033	Oct 2019	E. Krayukhina, A. Fukuhara, S. Uchiyama	Assessment of the injection performance of a tapered needle for use in pre-filled biopharmaceutical products
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.09.023	Sep 2019	Tapan K. Das, Linda O. Narhi, Alavattam Sreedhara, Tim Menzen, Christoph Grapentin, Danny K. Chou, Valentyn Antochshuk, Vasco Filipe	Stress Factors in mAb Drug Substance Production Processes: Critical Assessment of Impact on Product Quality and Control Strategy

<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.09.016	Sep 2019	Ranjana Singh, Lloyd Waxman	A streamlined bioanalytical approach to select a compatible primary container system early in drug development: A toolbox for the biopharmaceutical industry
<i>Current Directions in Biomedical Engineering</i>	doi: 10.1515/cdbme-2019-0052	Sep 2019	Anja Kurzhals, Christoph Brandt-Wunderlich, Niels Grabow, Klaus-Peter Schmitz, Wolfram Schmidt	Dynamic image analysis of transparent particles released during the simulated use test of cardiovascular devices
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2019.08.023	Aug 2019	Roman Mathaes, Mark Cornell Manning, Gerhard Winter, Julia Engert, Glenn A. Wilson	Shape Characterization of Subvisible Particles Using Dynamic Imaging Analysis
<i>Pharmaceutical Chemistry Journal</i>	doi: 10.1007/s11094-019-02005-z	Apr 2019	E.S. Novik, A.V. Dorenskaya, N.A. Borisova, O.V. Gunar	Subvisible Particulate Matter in Therapeutic Protein Injections
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2019.01.019	Mar 2019	C.F. Chisholm, T. J. Kang, M. Dong, K. Lewis, M. Namekar, A.T. Lehrer, T.W. Randolph	Thermostable Ebola virus vaccine formulations lyophilized in the presence of aluminum hydroxide
<i>Analytik News Das Online-Labormagazin</i>	Feb. 2019	Feb 2019	Michael Toni Sturm, Sven Kluczka, Axel Wilde, Katrin Schuhen	Determination of particles produced during boiling in different plastic and glass kettles via comparative dynamic image analysis using FlowCam
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2018.09.004	Jan 2019	Saki Yoneda, Bertram Niederleitner, Michael Wiggenhorn, Hiroki Koga, Shinichiro Totoki, Elena Krayukhina, Wolfgang Friess, Susumu Uchiyama	Quantitative Laser Diffraction for Quantification of Protein Aggregates: Comparison With Resonant Mass Measurement, Nanoparticle Tracking Analysis, Flow Imaging, and Light Obscuration
<i>ChemRxiv</i>	doi: 10.26434/chemrxiv.7367708.v1	Nov 2018	Laura Marvin, Wynter Paiva, Nicole Gill, Marissa A. Morales, Jeffrey Mark Halpern, James Vesenka, Eva Rose Balog	Flow Imaging Microscopy as a Novel Tool for High-Throughput Evaluation of Elastin-like Polymer Coacervates
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2018.08.006	Aug 2018	M. Kiyoshi, H. Shimada, A. Harazono, T. Torisu, T. Maruno, M. Akimaru, T. Asano, M. Kiokawa, K. Ikemoto, Y. Itakura, T. Iwura, A. Kikitsu, T. Kumagai, N. Mori, H. Murase, H. Nishimura, A. Oda, T. Ogawa, A. Ishii- Watanabe	Collaborative Study For Analysis of Subvisible Particles Using Flow Imaging And Light Obscuration: Experiences in Japanese Biopharmaceutical Consortium
<i>Fuel</i>	doi: 10.1016/j.fuel.2018.07.064	Jul 2018	Xianhua Feng, Daniel Fakunle, Keith Osness, Greg Khan, Larry Sartori	Oil in water characterization by dynamic optical fluid imaging technology
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2018.01.021	Jun 2018	Takahiro Maruno, Hiroki Watanabe, Saki Yoneda, Takayuki Uchihashi, Satoru Adachi, Kunihiro Arai, Taichi Sawaguchi, Susumu Uchiyama	Sweeping of Adsorbed Therapeutic Protein on Prefillable Syringes Promotes Micron Aggregate Generation
<i>Biotechnology and Bioengineering</i>	doi: 10.1002/bit.26746	Jun 2018	D.G. Greene, S.J. Traylor, J. Guo, L.H. Choe, S. Modla, X. Xu, N. Singh, Lye Lin Lock, S. Ghose, Zheng Jian Li, K.H. Lee, N. J. Wagner, A.M. Lenhoff	Mechanisms of precipitate formation during the purification of an Fc-fusion protein
<i>BioProcess International</i>	Vol. 16 (5)	May 2018	Kevin Mattison, Jonathan Mehtala, Maria Taddei, Jessica Cheung, Hiten Gutka	Rational design of liquid protein formulations: Application of biophysical stability predictors and descriptors to reformulate biotherapeutics
<i>Pharmaceutical Research</i>	doi: 10.1007/s11095-018-2422-5	May 2018	A.S. Sediq, R. Klem, M.R. Nejadnik, P. Meij, Wim Jiskoot	Label-Free, Flow-Imaging Methods for Determination of Cell Concentration and Viability
<i>Scientific Reports</i>	doi: 10.1038/s41598-018-24336-9	Apr 2018	Tengfei Fan, Jae Hyeon Park, Quynh Anh Pham, Ee-Lin Tan, Raghavendra C. Mundargi, Michael G. Potroz, Haram Jung, Nam-Joon Cho	Extraction of cage-like sporopollenin exine capsules from dandelion pollen grains
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2018.01.015	Jan 2018	Austin L. Daniels, Theodore W. Randolph	Flow Microscopy Imaging Is Sensitive to Characteristics of Subvisible Particles in Peginesatide Formulations Associated with Severe Adverse Reactions
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2017.12.008	Dec 2017	Christopher P. Calderon, Austin L. Daniels, Theodore W. Randolph	Deep Convolutional Neural Network Analysis of Flow Imaging Microscopy Data to Classify Subvisible Particles in Protein Formulations

<i>Journal of Industrial and Engineering Chemistry</i>	doi: 10.1016/j.jiec.2017.12.023	Dec 2017	Michael K. Corliss, Chuan Kiat Bok, Jurriaan Gillissen, Michael G. Potroz, Haram Jung, Ee-Lin Tan, Raghavendra C. Mundargi, Nam-Joon Cho	Preserving the Inflated Structure of Lyophilized Sporopollenin Exine Capsules with Polyethylene Glycol Osmolyte
<i>Advanced Functional Materials</i>	doi: 10.1002/adfm.201702338	Jul 2017	Hong Wang, Michael G. Potroz, Joshua A. Jackman, Bahareh Khezri, Tijana Marić, Nam-Joon Cho, Martin Pumera	Bioinspired Spiky Micromotors Based on Sporopollenin Exine Capsules
<i>Advanced Functional Materials</i>	doi: 10.1002/adfm.201700270	Jun 2017	Michael G. Potroz, Raghavendra C. Mundargi, Jurriaan J. Gillissen, Ee-Lin Tan, Sigalit Meker, Jae H. Park, Haram Jung, Soohyun Park, Daeho Cho, Sa-Ik Bang, Nam-Joon Cho	Plant-Based Hollow Microcapsules for oral Delivery Applications: Toward Optimized Loading and Controlled Release
<i>Journal of Industrial and Engineering Chemistry</i>	doi: 10.1016/j.jiec.2017.05.009	May 2017	Arun Kumar Prabhakar, Hui Ying Lai, Michael G. Potroz, Michael K. Corliss, Jae Hyeon Park, Raghavendra C. Mundargi, Daeho Cho, Sa-Ik Bang, Nam-Joon Cho	Chemical processing strategies to obtain sporopollenin exine capsules from multi compartmental pine pollen
<i>Pharmaceutical Research</i>	doi: 10.1007/s11095-017-2120-8	Feb 2017	A.S. Sediq, S.K.D. Waasdorp, M.R. Nejadnik, M.M.C van Beers, J. Meulenaar, R. Verrijck, W. Jiskoot	Determination of the Porosity of PLGA Microparticles by Tracking Their Sedimentation Velocity Using a Flow Imaging Microscope (FlowCAM)
<i>Pharmaceutical Research</i>	doi: 10.1007/s11095-016-2079-x	Dec 2016	Miguel Saggi, Ankit R. Patel, Theodoro Koulis	A Random Forest Approach for Counting Silicone Oil Droplets and Protein Particles in Antibody Formulations Using Flow Microscopy
<i>Advanced Functional Materials</i>	doi: 10.1002/adfm.201603550	Nov 2016	Lili Wang, Joshua A. Jackman, Wei Beng Ng, Nam-Joon Cho	Flexible, Graphene-Coated Biocomposite for Highly Sensitive, Real-Time Molecular Detection
<i>Materials Science and Engineering C</i>	doi: 10.1016/j.msec.2016.07.002	Jul 2016	Anderson J. Bonon, Marcus Weck, Estevam A. Bonfante, Paulo G. Coelho	Physicochemical characterization of three fiber-reinforced epoxide-based composites for dental applications
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2016.03.044	Jun 2016	Anacelia Ríos Quiroz, Christof Finkler, Joerg Huwyler, Hanns-Christian Mahler, Roland Schmidt, Atanas V. Koulov	Factors Governing the Accuracy of Subvisible Particle Counting Methods
<i>Nature: Scientific Reports</i>	doi: 10.1038/srep28017	Jun 2016	Jae Hyeon Park, Jeongeun Seo, Joshua A. Jackman, Nam-Joon Cho	Inflated Sporopollenin Exine Capsules Obtained from Thin-Walled Pollen
<i>Chem Nano Mat</i>	doi: 10.1002/cnma.201600004	Mar 2016	Jeongeun Seo, Lili Wang, WeiBeng Ng, Nam-Joon Cho	Preparation of Highly Monodisperse Electroactive Pollen Biocomposites
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/S0022-3549(15)00180-X	Mar 2016	J. Kotarek, C. Stuart, S.H. De Paoli, J. Simak, Tsai-Lien Lin, Y. Gao, M. Ovanesov, Y. Liang, D. Scott, J. Brown, Y. Bai, D.D. Metcalfe, E. Marszal, J.A. Ragheb	Subvisible Particle Content, Formulation and Dose of an Erythropoietin Peptide Mimetic Product are Associated with Severe Adverse Post marketing Events
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.xphs.2016.02.019	Feb 2016	Carly Fleagle Chisholm, Abby E. Baker, Kaitlin R. Soucie, Raul M. Torres, John F. Carpenter, Theodore W. Randolph	Silicone Oil Microdroplets Can Induce Antibody Responses Against Recombinant Murine Growth Hormone in Mice
<i>Journal of Industrial and Engineering Chemistry</i>	doi: 10.1016/j.jiec.2016.01.022	Feb 2016	Raghavendra C. Mundargi, Ee-Lin Tan, Jeongeun Seo, Nam-Joon Cho	Encapsulation and controlled release formulations of 5-fluorouracil from natural Lycopodium clavatum spores
<i>PLOS One</i>	doi: 10.1371/journal.pone.0150229	Feb 2016	Grant E. Frahm, Alex W. T. Pochopsky, Tessa M. Clarke, Michael J. W. Johnston	Evaluation of Microflow Digital Imaging Particle Analysis for Sub-Visible Particles Formulated with an Opaque Vaccine Adjuvant
<i>Royal Society of Chemistry Advances</i>	doi: 10.1039/c5ra27207f	Feb 2016	Raghavendra C. Mundargi, Michael G. Potroz, Jae Hyeon Park, Jeongeun Seo, Jae Ho Lee, Nam-Joon Cho	Extraction of sporopollenin exine capsules from sunflower pollen grains
<i>Nature: Scientific Reports</i>	doi: 10.1038/srep19960	Jan 2016	Raghavendra C. Mundargi, Michael G. Potroz, Jae Hyeon Park, Jeongeun Seo, Ee-Lin Tan, Jae Ho Lee, Nam-Joon Cho	Eco-friendly streamlined process for sporopollenin exine capsule extraction

<i>Advanced Functional Materials</i>	doi: 10.1002/adfm.201504940	Jan 2016	Lili Wang, WeiBeng Ng, Joshua A. Jackman, Nam-Joon Cho	Graphene-Functionalized Natural Microcapsules: Modular Building Blocks for Ultrahigh Sensitivity Bioelectronic Platforms
<i>Advanced Functional Materials</i>	doi: 10.1002/adfm.201502322	Jan 2016	Raghavendra C. Mundargi, Michael G. Potroz, Soohyun Park, Jae Hyeon Park, Hitomi Shirahama, Jae Ho Lee, Jeongeun Seo, Nam-Joon Cho	Raghavendra C. Mundargi, Michael G. Potroz, Soohyun Park, Jae Hyeon Park, Hitomi Shirahama, Jae Ho Lee, Jeongeun Seo, Nam-Joon Cho
<i>European Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.ejpb.2015.11.012	Nov 2015	Gene Merutka, Brian M. Murphy, Robert W. Payne, Glenn A. Wilson, James E. Matsuura, Charles S. Henry, Mark Cornell Manning	Stability of Lyophilized Teriparatide, PTH (1-34), after reconstitution
<i>Small Journal</i>	doi: 10.1002/smll.201500860	Oct 2015	Raghavendra C. Mundargi, Michael G. Potroz, Soohyun Park, Hitomi Shirahama, Jae Ho Lee, Jeongeun Seo, Nam-Joon Cho	Natural Sunflower Pollen as a Drug Delivery Vehicle
<i>Biologicals</i>	doi: 10.1016/j.biologicals.2015.07.011	Jul 2015	V. Corvan, L. O. Nanni, T. W. Spritznager, N. Aronima, S. Cao, P. Casti, T. Cecchini, M.R. DeFelippis, P. Garidel, A. Herre, A.V. Koulou, T. Lubiniecki, H.-C. Mahler, P. Mangiagalli, D. Nesta, B. Perez-Ramirez, A. Polozova, M. Rossi, D. Schmidt, R. Siedler, S. Slesak, A. Weiskopf, K. Winkler	Subvisible (2-100 µm) particle analysis during biotherapeutic drug product development: Part 2, experience with the application of subvisible particle analysis.
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps.24550	Jun 2015	Inna Levin, Shiri Zigman, Arthur Komlos, Juergen Kettenring	Development of Flow Imaging Analysis for Subvisible Particle Characterization in Glatiramer Acetate
<i>Pharmaceutical Technology</i>	Vol. 39, Issue 11, pg 38-42	Apr 2015	Carol Rea Flynn, Dan McNerney, Palak Shah	Identifying Causes of Delamination
<i>Pharmaceutical Technology</i>	Vol. 39, Issue 1	Jan 2015	Adeline Siew	Analyzing Protein Aggregation in Biopharmaceuticals
<i>European Journal of Pharmaceutics and Biopharmaceutics</i>	doi: 10.1016/j.ejpb.2013.03.029	Oct 2014	Hasset KJ, Cousins MC, Rabia LA, Chadwick CM, O'Hara JM, Nandi P, Brey RN, Mantis NJ, Carpenter JF	Stabilization of recombinant ricin toxin A subunit vaccine through lyophilization
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps.24184	Sep 2014	Elena Krayukhina, Kouhei Tsumoto, Susumu Uchiyama, Kiichi Fukui	Effects of Syringe Material and Silicone oil Lubrication on the Stability of Pharmaceutical Proteins
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps.23973	Jun 2014	Alana Gerhardt, Nicole R. McGraw, Daniel K. Schwartz, Jared S. Bee, John F. Carpenter, Theodore W. Randolph	Protein Aggregation and Particle Formation in Prefilled Glass Syringes
<i>Natural Products and Bioprospecting</i>	doi: 10.1007/s13659-014-0004-8	Feb 2014	Heisler J., Elvir L., Barnouti F., Charles E., Wolkow T.D., and R. Pyati	Morphological Effects of Natural Products in Schizosaccharomyces pombe Measured by Imaging Flow Cytometry
<i>European Journal of Pharmaceutical Sciences</i>	doi: 10.1016/j.ejps.2013.12.014	Dec 2013	Tobias Werk, David B. Volkin, Hanns-Christian Mahler	Effect of Solution Properties on the Counting and Sizing of Subvisible Particle Standards as Measured by Light Obscuration and Digital Imaging Methods
<i>Pharmaceutical Biotechnology</i>	doi: 10.1002/jps.23786	Nov 2013	Jesper Sondergaard Pederson, Malin Persson	Unmasking Translucent Protein Particles by Improved Micro-Flow Imaging Algorithms
<i>AAPS Journal</i>	doi: 10.1208/s12248-013-9522-2	Aug 2013	Sarah Zölls, Daniel Weinbuch, Michael Wigenhorn, Gerhard Winter, Wolfgang Friess, Wim Jiskoot, Andrea Hawe	Flow Imaging Microscopy for Protein Particle Analysis - A comparative Evaluation of Four Different Analytical Instruments
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps.23445	Jan 2013	Glenn A. Wilson, Mark Cornell Manning	Flow Imaging: Moving Toward Best Practices for Subvisible Particle Quantification in Protein Products
<i>Analytical Chemistry</i>	doi: 10.1021/ac300976g	Jul 2012	Patel AR, Lau D, Liu J	Quantification and Characterization of Micrometer and Submicrometer Subvisible Particles in Protein Therapeutics by Use of a Suspended Microchannel Resonator

FlowCam Publications and Posters

If you are interested in obtaining a copy of any of these papers, please contact Yokogawa Fluid Imaging Technologies (info@fluidimaging.com).

<i>World Environmental and Water Resources Congress 2010</i>	doi: 10.1061/41114(371)379	Apr 2012	Osei K, Brown L, Andoh R, Gwinn A	An Innovative and Rapid Method of Assessing Particle Shape and Size in Stormwater Runoff
<i>Journal of Encapsulation and Adsorption Sciences</i>	doi: 10.4236/jeas.2012.21001	Mar 2012	Kouassi GK, Teriveedhi VK, Milby CL, Ahmad T, Boley MS, Gowda NM, Terry RJ	Nano-Microencapsulation and Controlled Release of Linoleic Acid in Biopolymer Matrices: Effects of the Physical State, Water Activity, and Quercetin on Oxidative Stability
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps.23001	Mar 2012	Zöls S, Tantipolphan R, Wiggernhorn M, Winter G, Jiskoot W, Friess W, Hawe A	Particles in Therapeutic Protein Formulations, Part 1: Overview of Analytical Methods
<i>Genetic Engineering and Biotechnology News</i>	doi: 10.1089/gen.32.3.13.	Feb 2012	Beltzer J	Measuring and Characterizing Protein Aggregates
<i>Chemi Ingenieur Technik</i>	doi: 10.1002/cite.201100195	Feb 2012	Wenda N, Woehlecke H, Detloff T, Lerche D	Design of Particulate Systems by Variation of the Characteristics of Biogenic Particles
<i>University of Kansas Master's Thesis</i>		Dec 2011	Tobias Frommknecht	Comparisons of Two Different Analytical Methodologies for the Characterization of Sub-Visible Particles in Therapeutic Protein Formulations
<i>Pharmaceutical Research</i>	doi: 10.1007/s1095-001-0590-7	Sep 2011	René Strehl, Verena Rombach-Riegraf, Manuel Diez, Kamal Egodage, Markus Bluemel, Margit Jeschke, Atanas V. Koulov	Discrimination Between Silicone Oil Droplets and Protein Aggregates in Biopharmaceuticals: A Novel Multiparametric Image Filter for Sub-visible Particles in Microflow Imaging Analysis
<i>International Journal of Condition Monitoring</i>	doi: 10.1784/204764211798089057	Jun 2011	Vähöja PO, Pikkarainen HVS	Trends in industrial oil analysis- a review
<i>Journal of Yeast and Fungal Research</i>	Vol. 2(7) pp. 106-112	Aug 2011	Pyati R, Elvir LL, Charles EC, Seenath U, Wolkow TD	Imaging flow cytometric analysis of Schizosaccharomyces pombe morphology
<i>BioPharm International</i>		Aug 2011	Lew Brown	Characterizing Biologics Using Dynamic Imaging Particle Analysis
<i>Journal of Pharmaceutical Sciences</i>	doi: 10.1002/jps22097	Aug 2010	S.K. Singh, N. Afonina, M. Awwad, K. Bechtold-Peters, J.T. Blue, D. Chou, M. Cromwell, H-J Krause, H-C Mahler, B.K. Meyer, L. Narhi, D.P. Nesta, T. Spitznagel	An Industry Perspective on the Monitoring of Subvisible Particles as a Quality Attribute for Protein Therapeutics
<i>TMS Light Metals</i>	Vol. 2008 p. 875	Jan 2008	Bowers R, Ningileri S, Palmund DC, Vitichus B, Cannova F	New Analytical Methods to Determine Calcined Coke Porosity, Shape, and Size
<i>Drug Discovery & Development</i>	Vol. 14 No. 5		Gregory J. Morrone, Wasfi Al-Azzam	An Imaging particle Analyzer Can Give Researchers a Better Picture of Particles in Parenteral Formulations
<i>Center for Pharmaceutical Biotechnology, Dept Chemical & Biological Engineering, Univ of Colorado</i>			Austin Daniels, Nathaniel Maddux, Theodore Randolph	Comparison of Flow-Imaging Microscopy Protein Aggregate Imaging Data Using Kullback-Leibler Divergence
<i>Coriolis Pharma</i>			Daniel Weinbuch, Sarah Zolls, Michael Wiggernhorn, Gerhard Winter, Wolfgang FrieSS, Wim Jiskoot, Andrea Hawe	Differentiation of Protein Particles and Silicone Oil Droplets by Flow-Imaging Microscopy (MFI and FlowCam) and Resonant Mass Measurement (Archimedes)
<i>National Institute of Standards and Technology</i>			Michael J. Carrier, Richard E. Cavicchi, Dean C. Ripple, Joshua R. Wayment	Development of Standards for the Optical Detection of Protein Particles
<i>National Institute of Standards and Technology</i>			R.E. Cavicchi, Cayla Collett, Srivalli Telikepalli, Dean C. Ripple	Variable Threshold Method for Determining the Boundaries of Imaged Subvisible Particles
<i>Particle Characterization Laboratories, Inc.</i>			William Bernt	Screening Biopharmaceuticals with Flow Imaging; Finding the Missing Fraction

FlowCam Publications and Posters

If you are interested in obtaining a copy of any of these papers, please contact Yokogawa Fluid Imaging Technologies (info@fluidimaging.com).



	2011	Elise Schiltz, Erwin Freund, John F. Carpenter, Theodore W. Randolph	Shock-Induced Protein Aggregation and Particle Formation
		Lew Brown, William Bernt	A Comparison of Methods for Quantifying Silicone Droplets in Biologics Using Dynamic Imaging Particle Analysis
		Mark C. Manning, Glenn A. Wilson, Lew Brown,	Flow Imaging of Subvisible Protein Particles: Moving Towards Best Practices
		Lew Brown	The Importance of Image Quality in Quantifying Protein Aggregation Using Imaging Particle Analysis
Poster Event	Date	Authors	Poster Title
AAPS PharmSci 360	2020	Tingting Li, Diane Burgess	Optimization of Spray Drying of Mucoadhesive Microparticles Using Design of Experiments (DoE)
Colorado Protein Stability Conference	2019	V. Linkuviene, E. Ross, H.A. Wright, J.F. Carpenter	Effects of transportation of syringes containing protein formulations through a hospital pneumatic tube system: Particle characterization by multiple methods
Colorado Protein Stability Conference	2017	Bethany Brown, Michelle Devoe, Jeal Paul Habumugisha, Kathryn Roache-Johnson, Benjamin Spaulding, Heather Anne Wright	Comparison of Manual Pipetting vs. Automated Liquid Handler Pipetting into FlowCam 8100
Colorado Protein Stability Conference	2017	Richard Cavicchi	Measurement of aggregate density by sedimentation measurement
Colorado Protein Stability Conference	2017	Carly Chisholm	Primary container effects of particle formation in therapeutic protein formulations
Colorado Protein Stability Conference	2017	Austin Daniels	Comparing populations of subvisible particles in protein therapeutics using flow-imaging microscopy and the Kullback-Leibler Divergence
Colorado Protein Stability Conference	2017	Kaori Funatsu	Impact of sterilization on protein degradation in a polymer-base prefilled syringe
Colorado Protein Stability Conference	2017	Cheng Her, Chris Sieracki, Kent Peterson, Christian Mills, John Carpenter	FlowCam Nano provides counts, sizes, and images of nano- and microparticles: Application to a therapeutic protein pumping study
Colorado Protein Stability Conference	2017	Cheng Her	Analytical methods of particle formation during fill & finish operations
Colorado Protein Stability Conference	2017	Christine Probst	Measurement of protein aggregates and silicone oil droplets using Amnis imaging flow cytometry
Colorado Protein Stability Conference	2017	S. Shinoda	Influence of mechanical stress on SO-droplet formation in prefilled syringes
Colorado Protein Stability Conference	2017	Lea Sorret	Adsorption of recombinant human interleukin-1 receptor antagonist to silicone oil-water interfaces leads to gel formation and subsequent surface-induced aggregation
Colorado Protein Stability Conference	2017	Hao Wu	Extrinsic fluorescent dyes as tools to rapidly quantify protein particle concentrations
Colorado Protein Stability Conference	2017	Hao Wu	Protein particle generation in fill-finish pumping operations
Biotherapeutics Analytical Summit	2017	Yuanchun (Shirley) Zeng, Christine Probst, Kristina Cunningham	Characterizing mAb Aggregates by Orthogonal Methodologies
	2015	Benjamin Spaulding, Aaron B. Krueger, John F. Carpenter	Utilization of a FlowCam to Detect and Image Particle Concentration Differences in Prefilled Syringes
	2015	Lew Brown, Ben Spaulding	Glass Shard Detection in Protein Therapeutics Using Dynamic Imaging Particle Analysis
Baxter Healthcare Corp	2014	Grant Woodard, Dr. Steve Nail	The Influence of Formulation and Processing Conditions on Subvisible Particles in a Model Freeze-Dried Protein
Swiss Pharma Science Day	2014	Anacelia Rios Q, Christof Finkler, Hanns-Christian Mahler, Jorg Huwyler, Roland Schmidt, Atanas Koulov	Evaluation of Sub Visible Particle Counting Methods
AAPS National Biotechnology Conference	2014	Lew Brown, William Bernt	The Importance of Thresholding in Imaging Analysis of Protein Aggregates

FlowCam Publications and Posters

If you are interested in obtaining a copy of any of these papers, please contact Yokogawa Fluid Imaging Technologies (info@fluidimaging.com).



BioProcess International	2013	Arleene C. Velayo, Rachel Emergy, Danny Chou, Carolos Garcia, Charles Winter	Viral Filtration Performance and Overcoming Artifacts During Validation: A Case Study
CHI PepTalk	2013	David Palmund, Damon Pawlak, Benjamin W. Spaulding, Josh Geib, Fatma AlAzzam	FlowCam Technology for Monitoring Particles in Protein Therapeutic Formulations
Colorado Protein Stability Conference	2011	Kimberly J. Hassett, Megan Cousins, Pradyot Nandi, Robert N. Brey, John F. Carpenter, Theodore W. Randolph	Characterization of Particle Aggregation During Freeze Drying of Vaccines Containing an Aluminum Salt Adjuvant
Conference Presentations	Date	Authors	Presentation Title
		Danny Chou	Protein Aggregation and Emerging Tools to Support Development and Characterization
Patent Application	Date	Inventors	Title
<i>Stabilizing excipients for therapeutic protein formulations</i>		David S. Soane, Robert P. Mahoney, Philip Wuthrich, Daniel G. Green	
<i>Specialty Carbon Black</i>	Dec 2016	Andrew D Price, Christopher Hindson, Rajiv Bharadwaj, Sukhvinder Kaur, Geoffrey Mcdermott	Mobile Solid Phase Compositions for Use in Biochemical Reactions and Analyses